Remarks

I. Status of the Claims

Claims 1-7 and 9-12 are pending. No claims are amended by this response. A recitation of the pending claims is provided herein solely as a courtesy to the Examiner.

II. Rejections under 35 U.S.C. § 103(a)

1. Rejection over Harada in view of Guo, Vita and either Uedaira or Woditsch

Claims 1-7 and 9-12 are rejected as being unpatentable over Harada et al., US 2002/0090335, ("Harada"), in view of U.S. Patent No. 6,827,916 to Guo et al. ("Guo") and U.S. Patent No. 2,985,506 to Vita et al. ("Vita"), and either U.S. Patent No. 4,520,004 to Uedaira et al. ("Uedaira") or U.S. Patent No. 4,173,485 to Woditsch et al. ("Woditsch").

According to the Examiner, Harada teaches a process for producing a dielectric material (paragraph [0035]) comprising spherical barium titanate particles, wherein the Ba/Ti ratio is greater than one (paragraph [0001]) wherein the particles are sintered into a ceramic body (paragraph [0055], lines 1-4) wherein the barium titanate is produced by mixing titanium tetrachloride (paragraph [0068], lines 3-5) with barium chloride or barium nitrate (paragraph [0071], lines 1-4) wherein the barium chloride or barium nitrate is introduced with an aqueous alkali solution (paragraph [0071, lines 4-6]) such as sodium hydroxide, potassium hydroxide or ammonia water (paragraph [0069], lines 1-3) and the aforementioned reactants mixed to produce a reaction solution is aged at a temperature of 40 to 100°C (paragraph [0076], lines 3-7] and then subjecting the reaction solution to hydrothermal treatment at a temperature of from 100 to 350°C (paragraph [0079], lines 1-4) wherein the particles obtained are filtered (paragraph [0112], lines 14-15) then washed with water and dried (paragraph [0080], lines 1-3).

The Examiner acknowledges that Harada fails to teach that the amount of OH^- is constant. To overcome this deficiency of Harada, the Examiner relies on Uedaira or Woditsch. The Applicants respectfully traverse, on the basis that neither Uedaira nor Woditsch teach or suggest

"maintaining the reaction mixture at a constant OH^- concentration" in a ***one-step*** process for the preparation of barium titanate powders, as called for in claim 1.

Regarding Uedaira, the reference ***does not*** teach that OH^- concentration remains constant over the course of the entire reaction, as required by claim 1. Instead, Uedaira, at col. 3, line 66 to col. 4, line 26, only teaches that the hydrolyzation product of titanium Ti compound is reacted with a water-soluble metal salt in a strong alkaline aqueous solution or suspension having a pH of higher than 13.0, preferably 13.5 or above. Uedaira fails to teach that such a pH value should be maintained constant during the reaction. That is to say, Uedaira fails to teach an essential technical feature recited in the pending claim 1: "maintaining the reaction mixture at a constant OH^- concentration." As well known to those of skill in the art, the pH value will decrease in Uedaira as the reaction proceeds. As explained in a prior response, when the reaction is performed in a multi-step process (as in Uedaira and Woditsch, see below), the concentration of OH^- steadily decreases during the course of the reaction. There is no rationale contained in Uedaira to maintain the OH^- levels as a constant during the course of the reaction. Given the substantial drop in OH^- levels during the course of the reaction, as taught by Uedaira, Applicants assert that Uedaira teaches away from maintaining the OH^- levels as a constant concentration over the course of the reaction.

In addition, Applicants assert that the burden of showing a constant OH^- concentration in Uedaira falls upon the Examiner. The pH of the reaction solution disclosed by Uedaira would fall as the reaction proceeded, and it is not clear where in Uedaira the Examiner finds teachings of a constant pH over the course of the reaction.

Importantly, the present invention requires maintenance of a constant pH while the reaction occurs. It would not have been obvious to one of ordinary skill in the art to use the teachings of Uedaira to appreciate the unexpected results achieved by maintaining a constant pH during the reaction.

In addition, Uedaira teaches a method of manufacturing metal titanate fine powder ($MTiO_3$) in a two-step process: (1) preparing hydrolyzed compound of titanium compound, and (2) reacting said hydrolyzed compound of titanium compound with water soluble metal salt of Ba, Sr or Ca in an

aqueous alkaline solution having pH not less than 13 (*see* Uedaira at col. 2, lines 21-31) and the reaction will take a few hours (*see* Uedaira Examples, beginning at col. 6). As mentioned in the previous response, however, the reaction according to the present invention, and as claimed in claim 1, is carried out in accordance with the principle of a ***one-step*** process and macroscopically, the aqueous solution of titanium and barium is reacted with an excess of OH^- in ***one step*** (which is instantaneous and rapid) to obtain barium titanate powders as described in the present invention.

The novel present invention requires a one-step process to prepare barium titanate powders. Nowhere does Uedaira teach a ***one-step*** reaction performed at a constant pH, or provide a rationale to perform the reaction in ***one step*** at a constant pH. Thus, Uedaira cannot cure the deficiency of Harada. Accordingly, it would not have been obvious for one of ordinary skill in the art to arrive at the present invention upon the teachings of Uedaira in combination with Harada.

Nor can Woditsch cure the deficiency of Harada. The Examiner asserts that Woditsch teaches a process for making alkaline earth titanates by precipitating hydroxides at a constant pH value. Woditsch teaches that only by precipitating the hydroxides at a constant pH value, it is possible to obtain commercially processible, reactive hydroxides from zinc and alkaline earth metal hydroxides and TiO_2-hydrolyzate sludges, which is then calcined at high temperatures to form the corresponding alkaline earth metal titanates (*see* Woditsch at col. 2, lines 33-39) According to Woditsch, the purpose of maintaining a substantially constant pH value is to obtain readily filterable and washable precipitates, which can then be calcined at high temperatures to form titanates (*see* Woditsch at col. 2, lines 2-11), and the production of zinc or alkaline earth metal titanates involves a ***two-step reaction***: (1) precipitating zinc or alkaline earth metal hydroxides in the presence of finely divided titanium dioxide to obtain reactive hydroxides, and then (2) calcination (*see* Woditsch at col. 1, lines 49-54).

To the contrary, the reaction according to the present invention is carried out in accordance with the principle of ***one-step reaction*** and macroscopically, the aqueous solution of titanium and barium is reacted with an excess of OH^- in one step to obtain barium titanate powders as described in the present invention. The Examiner contends that instant claim 1 recites three

steps: the reaction itself, filtering, and drying, and asserts that Woditsch teaches the reaction and calcinations, and that calcinations is analogous to the drying step in the current invention (*see* Office Action at p. 3). The Examiner's assertion is incorrect, and one of ordinary skill in the art at the relevant time (i.e., the time of filing of the current patent application) would understand that Woditsch teaches a ***two-step reaction***, while the claimed process calls for a ***one-step reaction***. The two other steps mentioned by the examiner, that is, filtering and drying, are after-treatment (or "after-reaction") steps. In Woditsch, on the other hand, the first reaction step results in a suspension (which is subsequently filtered) and in the second reaction step the resultant filter cake is calcined at above 500°C to produce the desired titanate of a suitable particle size and narrow particle size distribution. It is well known in the art that the drying step is clearly different from the calcination step, with the latter being carried out at a much higher temperature – certainly, one of ordinary skill in the art at the relevant time would understand this. In fact, the Woditsch reference itself acknowledges that the zinc titanates or earth metal titanates are not produced in the process taught therein until after the second step, i.e., calcination (*see, e.g.*, Woditsch at claim 1 ("calcining the solids at a temperature above about 500°C thereby to ***produce*** the titanate"); col. 1, lines 27-30 ("[u]sing titanium dioxide and the corresponding oxides or decomposable salts of magnesium or calcium as the starting materials, the alkaline earth metal titanate is ***obtained*** by calcination at high temperatures"); and col. 2, lines 37-39 ("reactive hydroxides from zinc and alkaline earth metal hydroxides and TiO_2-hydrolyzate sludges which can be calcined at considerably lower temperatures, preferably below 900°C., to ***form*** the corresponding alkaline earth metal titanates ...."). Thus, Woditsch teaches a ***two-step reaction*** for producing titanates, which is unlike the claimed process which produces titanates in a ***one-step reaction***. And, contrary to the claimed process, Woditsch does not teach or suggest ***"maintaining the reaction mixture at a constant OH^- concentration"*** over the entire course of the reaction that produces titanates, which would necessarily include the calcination step, because titanates are not produced until that step. In fact, Woditsch only teaches maintenance of constant pH during the first step of the reaction, i.e., precipitating hydroxides, and is absent any teaching or suggestion whatsoever of the pH during the second step of the reaction, i.e., calcination. Thus, Woditsch also cannot cure the deficiency of

Harada. Accordingly, it would not have been obvious for one of ordinary skill in the art to arrive at the present invention upon the teachings of Woditsch in combination with Harada.

Thus, neither Uedaira nor Woditsch can cure the deficiency of Hadara, and one of ordinary skill in the art at the relevant could not have employed the combined teachings of Hadara and Uedaira or Woditsch to reach the invention recited in claim 1 of the instant patent application. For the sake of completeness, the Applicants respectfully point out that claim 1 is not obvious even if one includes the teachings of Vita and Guo with those of Harada, Uedaira and Woditsch, because neither Vita and Guo teach ***"maintaining the reaction mixture at a constant OH^- concentration"***, and thus neither of this references can cure this deficiency of Harada, either.

Claims 2-7 and 9-12 ultimately depend from claim 1. A dependent claim includes all the limitations of the claim from which it depends (and further limits the claim). Thus, because claim 1 is not rendered obvious over Hadara in view of Vita, Guo, and either Uedaira or Woditsch, claims 2-7 and 9-12 are not rendered obvious over the combined teachings of the cited references, either.

In view of the above, a person skilled in the art would not conceive the technical solution of the presently claimed process for the preparation of barium titanate powders by simply combining the reaction of Harada with the teachings of Vita and Guo and either Uedaira or Woditsch.

Based on the above reasons, Applicants request that the obviousness rejections be withdrawn.

III. Conclusion

This application is believed to be in condition for allowance, which is earnestly solicited. If the Examiner believes there are further issues that could be advance by an interview or entry of an Examiner's Amendment, the Examiner is invited to contact the undersigned attorney.

Dated: June 2, 2009

Respectfully submitted,

By ______________________

Andrew K. Holmes
Registration No.: 51,813
DARBY & DARBY P.C.
P.O. Box 770
Church Street Station
New York, New York 10008-0770
(212) 527-7700
(212) 527-7701 (Fax)
Attorneys/Agents For Applicant